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EXAMINATION OF E-3 AWACS READINESS SPARES KIT ADEQUACY DURING OPERATION ALLIED FORCE

by

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Abstract

This report reviews the critical importance of E-3 aircraft in today's air operations, examines the supply concept for deployed aircraft packages, and assesses the adequacy of deployed E-3 AWACS readiness spares kits during Operation ALLIED FORCE. Also, FY 1999 summary readiness indicator statistics for the E-3 fleet, at different deployed locations and home station, before, during, and after ALLIED FORCE are presented. Recent E3 spares shortages in other deployed operations have prompted senior leadership to consider spares adequacy issues force wide.

Additionally, the annual E-3 RSP review process is considered, with a focus on understanding how the new concept of "agile logistics" and depot "EXPRESS" initiatives have impacted E-3 readiness. Cost trends in E-3 RSP kit configuration are presented, along with a discussion of various recent "top-ten" MICAP problem parts.

The author concludes that extraordinarily high E-3 mission capable rates achieved during the 78-day ALLIED FORCE air operation were primarily due to opportune logistical support from the NATO E-3 base of Geilenkirchen rather than deployed E-3 RSPs. During the conflict's limited timeframe, nearly 200 reparable parts were borrowed from our NATO allies to solve E-3 MICAP situations as initial communication and logistical delays hampered U.S. resupply efforts.

Finally, the author observes that recent initiatives to increase spares inventories through increased funding are likely to raise E-3 mission capable rates.

Part 1

Introduction

Gentlemen, the officer who doesn't know his communication and supply, as well as his tactics, is totally useless!

— Lt Gen George S. Patton

The Air Force E-3 Airborne Warning and Control System (AWACS) provides the indispensable "all-weather surveillance, command, control and communications needed by commanders of U.S. and NATO air defense forces," and is a critical component of every air operation U. S. forces participate in.[1] Indeed, during DESERT STORM E-3s provided critical radar surveillance and aircraft control to friendly forces, with their airborne controllers participating in 38 of 40 recorded air kills.[2] Not surprisingly, other nations fully recognize the value of an AWACS capability and NATO, Britain, and France have all acquired E-3's[3]. Most recently, E-3s played a decisive role during air operations in Kosovo.

The E-3 is both a complex and aging aircraft. In addition to "normal" airframe components, the E-3 is literally packed full of high-tech radar, navigation, communication, and computer systems; all mission essential systems in supporting the resident air battle management staff. While this high-tech suite of equipment does permit phenomenal surveillance and intercept events to occur in modern air warfare, it also presents significant maintenance and supply challenges to those personnel charged with ensuring that mission-ready aircraft are available for each day's Air Tasking Order (ATO). This paper focuses on the specific logistics challenges,

and spare parts adequacy experienced during the 78-day air campaign in Kosovo, Operation ALLIED FORCE. In order to put E-3 support during the operation in context, a review of overall-fleet E-3 spare's support during FY 1999 is presented here.

Vital Role of AWACS in Air Operations

As already mentioned, the E-3 is core to any package of air assets being assembled by a Joint Forces Air Component Commander (JFACC). In fact, AWACS plays such a critical role in air operations that large-scale exercises face the threat of cancellation when AWACS isn't available. Simply put, E-3s are an indispensable part of today's air power.

Figure 1. E-3 AWACS[4]

Today's E-3 Fleet is Heavily Tasked

E-3 aircraft and crews have been operating at a hectic pace since well before DESERT STORM commenced and the stress on certain systems is beginning to show. Currently, there are a number of forward deployed operating locations and the typical aircraft averages many days away from home station each year, although very limited supply functions are maintained at these locations. As a result, logistics support is quite a challenge since forward-deployed units

have minimal supply support beyond the deployed spares. As depicted in Figure 2, E-3s operate virtually around the world.

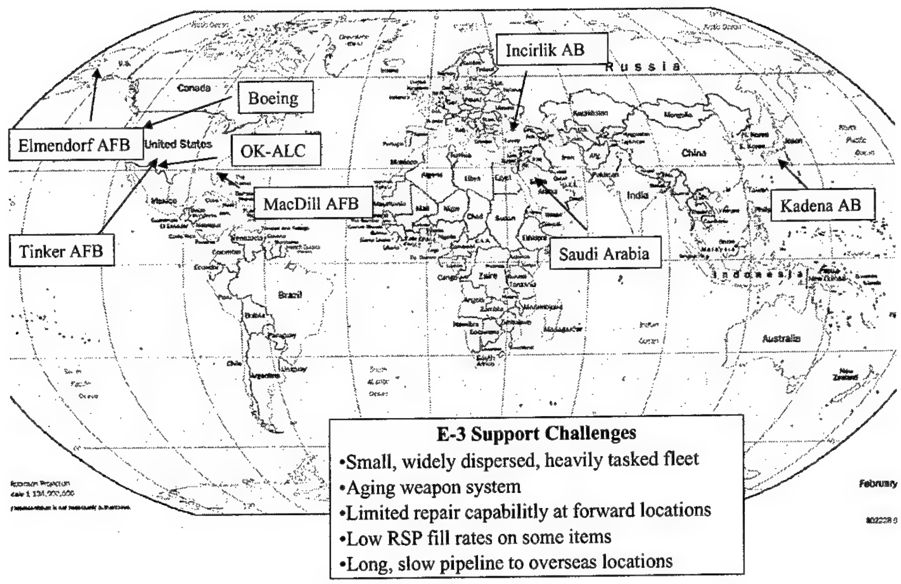

Figure 2. Many Different Operating Locations

Since forward locations generally have only two to four E-3s on station at any given time, keeping aircraft mission capable in support of daily operations is a substantial challenge. Supply operations are often frustrated by host-nation stipulations that U.S. forces not establish any base functions that look "permanent", less the populace conclude deployed forces are something more than temporary visitors. Consequently, supply policy dictates that properly-stocked mobility spares kits, vice well-stocked in-place spares kits, accompany deploying aircraft.

How the Air Force Determines Spares Requirements

Air Force logisticians expend great time and effort determining how many spare parts to include into support packages, known as Readiness Spares Kits (RSPs), that stand ready to accompany deploying air units. The operational maintenance objective of these RSPs is to

support sustained combat operations for a minimum of 30 days without benefit of resupply.[5] It is not cost-effective, or supportable with limited airlift resources, to include ALL possible parts, therefore a computer model known as the Aircraft Sustainability Model (ASM) is used to determine which items are most worthy of inclusion. The model's function was recently described in the Air Force Logisitics Management Agency 3rd Quarter Review:

> The ASM is the black box analytical model embedded in the Requirements/Execution Availability Logistics Module. As such, it provides the program logic to compute the best mix of parts to include in MSRPs. .....
>
> ...So we try to find a mix of parts that will satisfy, within our constraints, most of our needs. ASM computes a kit using marginal analysis – picking first the part that gives the most bang for the buck, then the next greatest ban for the buck, and so on until we run out of money or reach a predetermined aircraft availability goal.[6]

As is generally the case in computer simulations, ASM model results are heavily influenced by maintenance grounds rules, supply assumptions, and parameter estimates on key input variables such as planned flying hours, sortie rates, and mean time between failures (MTBF). Consequently, kit contents are often tailored to specific theaters of operation and employment schemes.[7]

Evolutionary Changes in Air Force Logistics

Since the early 1990s, the Air Force has embarked on a campaign to streamline the logistics process and reduce inventory levels. Furthermore, the shift to an expeditionary force has meant fewer deployments to forward locations with full maintenance support. Consequently, deployed forces are increasingly fighting wars in a "come as you are" fashion, highly dependent on organic spares kits and quick resupply. These conditions have long been the norm for E-3s.

The forerunner to agile logistics was "lean logistics", a concept which envisioned reduced base and depot inventory levels, but employed faster transportation to get parts more quickly to

end users. By significantly reducing pipeline time for expensive items transiting supply channels to and from bases, substantial savings were realized. Although actual component repair times have changed little, air transportation and immediate FIFO attention at depot (i.e., elimination of idle time) have greatly shortened turn-around times.[8] From the growing pains of early lean logistics attempts, agile logistics was born.

Agile logistics explicitly focuses on increasing combat support to end-users and has employed better demand-forecasting tools to anticipate repairs and parts requests, along with the previously mentioned rapid transportation. The Air Force's chief logistician, Lt Gen Hallin, observed that the repair cycle for a representative non-consumable item had decreased from 31 days in FY 1994 to less than 22 days in FY 1997, a reduction of thirty percent.[9]

Supply vs. Maintenance Role in Resolving MICAPs– Keeping Score!

The Air Force has a well-established system of logistic metrics for determining how effectively supply and maintenance activities are supporting a wing's aircraft fleet. Simply put, these metrics are used for tracking aircraft mission-ready status, monthly sortie rates, and non-availability due to spare parts or maintenance shortfalls. When aircraft availability falls short of command expectations, the metrics provide a useful focal point for further examination.

The single most watched metric is probably the mission capable (MC) rate. Computations begin with a determination of how many hours in a given month each aircraft was in the wing's "possession", or control. Then a calculation is done to determine how many hours each of these aircraft was either fully, or partially, mission capable. Finally, the ratio of (FMC+PMC) to possessed hours yields the MC rate. For the E-3 fleet, an ACC standard of 85 percent MC has existed since FY 1996. Unfortunately, this expectation has rarely been met in recent years, although an exceptionally high mission capable rate was achieved for the E-3 during Operation

ALLIED FORCE.[10] Figure 3 compares mission capable rates for ALLIED FORCE E-3s against the E-3 fleet.

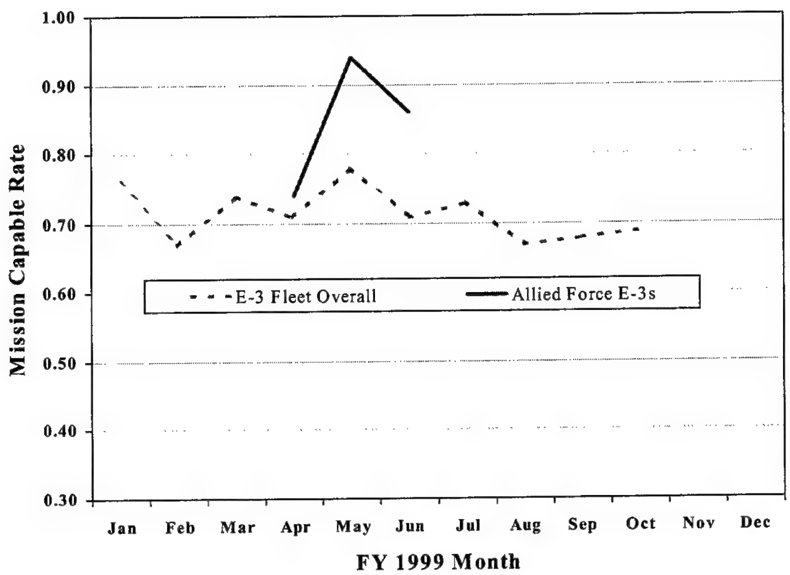

Figure 3. Comparison of E-3 Mission Capable Rates

When aircraft are non-mission capable, either supply or maintenance activities are charged with the hours an aircraft is out of service, depending upon the circumstances. As aircraft parts break and must be replaced, wing maintenance personnel perform diagnostic and repair activities to locate the offending component(s). Needed replacement parts are requisitioned from base supply, spares kits, or backordered. During periods wing aircraft are unavailable due to maintenance activity, those hours are charged against maintenance; however once a replacement part has been requested, the supply function's clock beings running. In the E-3, three main areas (engines, surveillance radar, and fuel system) occupy the majority of fleet maintenance and supply demand activities,[11] consequently having sufficient spares for those items which frequently need replacement is critical to achieving high mission capable rates.

Notes

[1] HQ Air Force E-3 fact sheet.

[2] Ibid.

[3] Ibid

[4] Lt Col Donald G. Somerville, interviewed by author during visit to Tinker AFB, 8 Feb 00.

[5]Capt Kevin J. Gaudette, "A Black Box That Works For You," *AFLMA: Third Quarter in Review, (*Winter 1999): 19-20.

[6] Ibid.

[7] Ibid.

[8] "Speed replaces size in Lean Logistic' approach to inventories." *AF News,* 11 Apr 96. (no pagination). On line. Internet. Available from http;///www.af.mil/news/Apr1996/n19960411_960336.html

[9] "Agile logistics: Where we've been, where we're going." *AF News*, 28 Apr 98, (no pagination). On line. Internet, Available from: http;///www.af.mil/news/Apr1998/n19980428_980559.html

[10] Personal interview with SMS Polesky and review of 552 ACW Maintenance Digest 9302.

[11] OC-ALC/LAK briefing slides, Feb 99.

Part 2

Logistics Support Concept for Deployed E-3 Packages

The Air Force logistics system is large and complex, but agile logistics has already shown us how we can improve support to our warfighters.

— Lt Gen William P. Hallin

Because of its indispensable role in deployed air operations, E-3 maintenance and spares support is a high priority for both AFMC and ACC. However, the E-3 is an aging system, and three different ongoing modification programs (20/25, 30/35, RSIP) significantly complicate logistics support. Furthermore, fiscal constraints and limited airlift assets dictate that spares kits be limited to the minimum size necessary to meet operational readiness objectives.

Planning Factors vs Reality

An important first step in spares planning for any system is estimating requirements (parts demand) based on anticipated flying hours, sortie rates, and historical module failure rates. For the E-3 fleet, the primary planning factors are planned (programmed) flying hours and component mean time between failure (MTBF) rates, as documented in fifteen-month supply demand data reported by using bases during the annual kit review.

Two types of spares kits containing reparable parts currently exist for the E-3 system; mobility readiness spares packages (MRSP) and in-place readiness spares packages (IRSP). The single IRSP exists at Kadena AB, as political sensitivities in Turkey and Saudi Arabia preclude

establishing any USAF E-3 maintenance capability or level of provisioning that looks "permanent". The other nine spares kits are MRSP's configured and located as shown in the table below. Differences in "Tinker AFB" authorized kit item quantities are due to the necessity of supporting three different on-going E-3 modifications.

Table 1. FY 1999 E-3 Reparable Spare Kit Types and Locations

LOCATION	PAA	TYPE KIT	Authorized Number of Items
Tinker AFB	3	MRSP	731
Tinker AFB	3	MRSP	893
Tinker AFB	3	MRSP	810
Tinker AFB	2	MRSP	810
Turkey	3	MRSP	731
MacDill	2	MRSP	731
Saudi Arabia	3	MRSP	893
Saudi Arabia	2	MRSP	731
Elmendorf	2	MRSP	948
Kadena	2	IRSP	703
TOTALS	25	Both Types	7,981

Source: OC-ALC E-3 RSP Inventories

Table 2 reflects "planned" versus "actual" E-3 flying hour experience, both aggregated for the fleet and broken out by deployed location, during FY 1999. In theory, having a close match between actual and programmed flying hours at a given location allows greater accuracy in estimating actual supply demands and facilitates an informed decision on which spares kit(s) to deploy. However, since Operation ALLIED FORCE was unplanned (from the flying hour budgeting perspective), that campaign's E-3 flying hours largely came from home station accounts.

Table 2. FY 1999 Planned vs Actual E-3 Flying Hours by Location

	Programmed	Actual	Delta
Home Station	11,547	9,608	-1,939
Saudi (SW)	3,212	2,982	-230
Turkey (NW)	2,066	2,038	-28
ALLIED FORCE	n/a	1,527	+1,527
ACC Total	18,354	16,156	-2,198
Kadena	1,200	1,146	-54
Elmendorf	2,519	1,927	-592
PACAF Total	3,643	2,908	-735
Entire Fleet Totals	4,927	4,529	-398

Source: OC-ALC Indicators Report

Role of the Tinker AFB Sentry Control Point

Because E-3s are the textbook case of a classic "high demand, low density" weapon system which is continuously deployed in small numbers to numerous hot spots around the globe, 552 Air Control Wing (ACW) and OC-ALC personnel jointly operate a status-monitoring activity at Tinker AFB known as the Sentry Control Point (SCP). Established in 1979, the primary function of this vital activity is to provide a single point of "providing and coordinating positive logistical support" for the widely dispersed E-3 fleet.[1] Specific SCP activities include locating and shipping high-priority parts to solve MICAP situations at forward-deployed locations, a function that is exercised many times daily. During FY 1999, the SCP was actively involved in resolving 2,015 E-3 MICAP supply situations.[2] The table below compares SCP-controlled supply fulfillment times to the different deployed locations, clearly showing how increased use of commercial expeditors during the last several years has reduced transportation pipeline periods.

Table 3. Comparison of E-3 MICAP Supply Fulfillment Times (days)

	Kadena	Elmendorf	MacDill	Saudi	Turkey
CY 94	7.7	2.4	-	5.8	5.4
CY 95	6.7	1.6	-	6.1	3.1
CY 96	4.8	.92	-	5.4	4.7
CY 97	4.7	.98	-	3.5	4.9
CY 99	4.2	1.0	2.0	3.1	4.0

Sources: OC-ALC briefing, SCP records

By consistently providing focused, priority attention along with innovative delivery means (they often have rotating personnel hand carry parts), the SCP significantly improves fleet-wide E-3 readiness. During Operation ALLIED FORCE, they coordinated the transfer of nearly 200 parts from NATO's E-3 supply system to U.S. E-3 maintainers working MICAP issues at Geilenkirchen AB, thus enabling a very high mission capable rate and near-zero "supply out" condition.[3]

Spares Forecasting Methodology

Ultimate responsibility for determining what items to stock in the E-3 RSPs rests jointly with the using command and OC-ALC kit manager and is determined during an annual review held at Tinker AFB. Attendees include MAJCOM representatives from ACC and PACAF, AFMC E-3 program office personnel, ALC equipment specialists, and personnel from the 552 ACW. As might be expected, there is ample higher-headquarter guidance for conducting such reviews; AFM 67-1, Chapter 14, *Readiness Spares Packages (RSP) and High Priority Mission Support Kits (HPMSK)*.[4] How well this once-a-year process works for low density aircraft like the E-3 is not clear.

During the kit review there are actually two different RSPs designed; a "contingency package" for the force as it currently exists, and a "buy package" that forecasts desired kit composition two years in the future. The buy package, perhaps significantly different due to anticipated changes in fleet size, expected failure rates, etc. exists only on paper and is computed in order to provide inputs to outyear budget cycles.[5]

Did Agile Logistics Change E-3 Kit Composition?

In discussions with both the ALC kit manager and SCP OIC, it appears little, if any, change to E-3 RSP kit composition has occurred during the recent move to "agile logistics" seen during the 1990s. This exception to the well publicized (and sometimes criticized) Air Force-wide trend in reducing spare's inventory levels and shifting from a three-level to two-level maintenance concept has largely missed the E-3 weapon system. Primary reasons include the unique E-3 concept of operations (CONOPS) of deploying small 2-3 ship packages, having only a single main operating base at Oklahoma City, and most importantly, a complex, expensive suite of equipment. In actuality, the E-3 supportability experience has been one of "lean logistics" for many years.

Today's E-3 Readiness Spares Kit

As mentioned earlier, the E-3 is a complicated, aging weapon system that has currently fielded aircraft configured in one of three different modifications; the block 20/25, 30/35, and RSIP variations. Because of these differences, RSP kits, while tailored, must still be robust enough to handle whichever configuration of aircraft deploy. Moreover, aggregate spares costs are increased by the necessity of maintaining parts for the various modification.

Keeping RSP kits stocked at levels agreed upon during the annual kit review conferences presents a substantial challenge for reasons that will be discussed in greater detail later. Briefly, the challenges include unexpected decreased MTBFs on certain parts, competing depot repair priorities, occasional lapses in vendor contracts, shortages in certain reparable items due to parts condemnations, and difficulties getting failed carcasses back to depot in a timely fashion. In a system as complex as the E-3, many of these underlying causes remain invisible until such time as critical shortages of certain items develop.[6]

Table 4 shows aggregated, fleet-wide average kit fill rates over the last decade. As the data implies, kits accompanying deploying aircraft frequently have less than a full complement of desired parts. In recognition of this, a priority kit-fill scheme has been developed which gives kit restock priority to operationally-significant locations like Turkey and Saudi.

Table 4. Average E-3 RSP Kit Fill Rates (of Authorized Level)

FY	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fill Rate	78%	81%	83%	76%	75%	80%	80%	79%	72%	76%

Source: OC-ALC Briefing, Slide 15

Notes

[1] Maj Chris Roach., "Background Paper on the AWACS Sentry Control Point", OK-ALC/LAKMA, 6 Dec 99.
[2] Authors personal interview with Major Roach, SCP, 8 Feb 00.
[3] Ibid
[4] Air Force Manual (AFM) 67-1, *War Reserve Materials,* vol. 1, Part One, 18 Nov 99.
[5]Ibid, page 10.
[6] SMSgt Polesky interview.

Part 3

Maintenance Challenges during ALLIED FORCE

This data was key to our logisticians being able to aggressively manage the supply chain and speed urgently needed spars to the fighting units.

— Lt Gen George Babbitt, AFMC Commander

Operation ALLIED FORCE represents something of an anomaly to logisticians responsible for E-3 support in that host base support far exceeded anticipated levels and standard RSP kits did not immediately arrive with deploying aircraft. Fortunately, since most US E-3 aircraft were forward deployed to Geilenkirchen (GK) where NATO operates its own fleet of E-3As, base maintenance stores and organic support facilitated high "mission ready" status. This friendly assistance occurred throughout the campaign, thereby minimizing adverse impacts from late E-3 RSP arrivals, delayed carcass returns, and communications challenges.

As shown in Figure 4, the ALLIED FORCE tasking did not result in an increased number of E-3 sorties fleet-wide. Rather fleet-wide sorties continued to average 175 per month, but training sorties at Tinker AFB were reduced as crews and spares headed to war. US E-3 sorties flown in ALLIED FORCE range from approximately 25 in the first month to better than 50 in the final month.

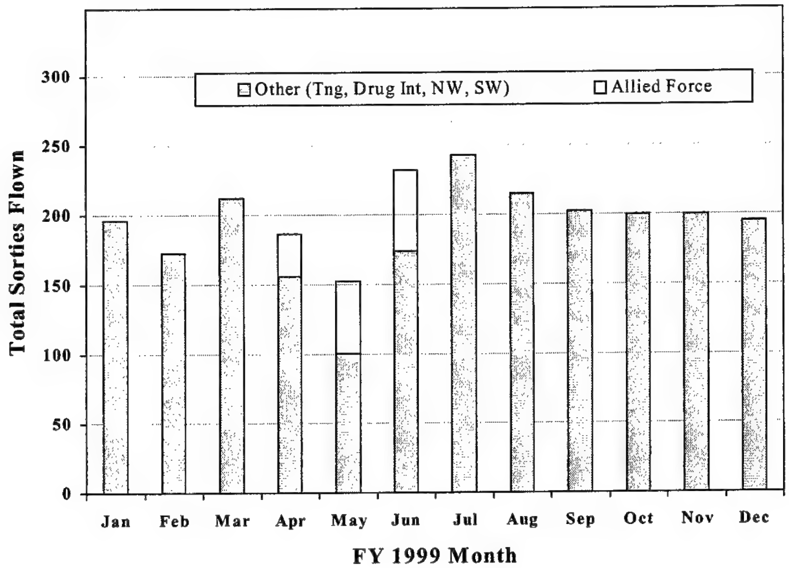

Figure 4. 552 ACW FY 1999 Monthly E-3 Sorties

E-3 Deployed Supply and Maintenance Support

When E-3s deploy, supply/maintenance personnel and MRSPs either accompany, or closely follow, the aircraft within a very few days. In cases where standard operating locations exist (e.g., Turkey, Saudi), in-place readiness spares, or mobility readiness spares, are prepositioned and standing (but limited) maintenance functions exist. While this CONOPS works quite well, the paradigm was not followed when HQ ACC ordered E-3s to Geilenkirchen in support of Operation ALLIED FORCE. According to those familiar with the operation, insufficient airlift was available to move the standard MRSPs until two weeks after the initial deployment, thereby requiring US E-3 supply personnel to borrow a substantial number of reparable spare parts from the NATO E-3 system at Geilenkirchen.[1]

Opportune Logistical Support from NATO E-3 Stores

Fortunately, NATO has not adopted the Air Forces current lean logistics approach and instead maintains high levels of E-3 spares at GK. As mentioned earlier, when the initial package of three E-3s moved from their forward-deployed location in Turkey to GK, their RSP did not immediately accompany them.

E-3 MICAP Rates

E-3 MICAP "supply" rates during ALLIED FORCE were very low, due primarily to the previously mentioned superb logistics support from NATO's Geilenkirchen Air Base. According to the SCP, NATO E-3s share greater than 90 percent commonality, but more importantly, NATO has not adopted a lean logistics approach similar to the US's. Consequently, there are large base-level spares inventories immediately available to maintainers when aircraft systems break, not thinly-filled RSP kits.

Logistics Hangover from BRAC Depot Closures

E-3 spares support comes from several different depots and Defense Logistics Agency locations, thereby making system-wide support monitoring more difficult for the weapon system owners. Further complicating visibility into depot support issues is a "hangover" effect following depot closures at San Antonio and Sacramento ALCs. Unfortunately, the lost repair shop time occurring as one depot closed and another didn't spin up until months later was aggravated when several key contacts with outside vendors lapsed. It was until the new depot shop was up and running, low on parts, that the out-of-date contracts were discovered.[2] The data in Table 5 clearly reflect the resulting impact on RSP fill rates, although other factors may be contributing as well. For example, higher break rates (shorter MTBF) could be contributing to

increased parts usage. Also, carcass condemnations effectively reduce inventory levels, making repair times more critical.

Table 5. Average RSP Fill Rates by FY

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fill Rate	78%	81%	76%	75%	80%	80%	80%	74%	72%	76%

Source: OC-ALC Briefing, Slide 15.

Notes

[1] Maj Roach interview.
[2] SMSgt Polesky interview.

Part 4

E-3 Supply Policy Analysis

The goal of the Air Force logistics system is to attain peacetime and wartime aircraft availability goals with the minimum amount of inventory and expense.

— Dr. Douglas J. Blazer

In an ideal world, E-3 RSP composition would be closely informed by the ASM sustainment model and require little or no adjustment. Spares demand data from the field would reflect consistent MTBF rates and not have wide fluctuations currently being experienced in the E-3 fleet. Unfortunately, a variety of factors serve to confound supply demand, thereby requiring substantial interpretation of annual kit review results.

Recommendations for Kit Composition

Beyond those items needed due to E-3 system modifications, there have been surprisingly few dramatic changes to E-3 RSPs during recent years. A review of FY 1999 supply demand data, REALM-ASM model results, and experiences during ALLIED FORCE suggest that the bigger challenge in not in designing kits, but rather keeping them stocked to authorized levels. This is especially true as supply and repair functions spin up at new depot locations following the BRAC closures at Sacramento and San Antonio ALCs. Often times, individual item shortages can be traced directly back to "root causes" in the depot repair process that, had they been properly anticipated, would have been afforded higher AFMC depot repair priority BEFORE

stock-out conditions occurred. Obviously, this is easier said than done, given the myriad of different items being worked by the depots. However, the objective of perfect visibility into depot repair processes and carcass locations should continue as a primary item manager goal in hopes of preventing future MICAP situations.

Sensitivity to Enroute Shipping Times

Table 6 below provides various detailed readiness indicators for the E-3 fleet, both at home station (Tinker AFB) and several deployed locations. Several interesting observations can be made from reviewing the table. First, it's obvious that supply priorities in kit fills favor the deployed locations, vice home station. According to the SCP and OC-ALC, that is by design since home station missions are typically lower-priority training sorties.[1] Compensating for lower RSP kit levels at Tinker AFB is the opportunity to cannibalize from aircraft in depot maintenance, an event that SCP officials report took place 142 times in FY 98 and 71 times in FY 99.[2] While depot aircraft represent something akin to a "bonus" RSP, the cannabilization process constitutes a duplication of effort (i.e., working two aircraft for one part).

Table 6. FY 1999 12-Month Aggregated E-3 Readiness Indicators

	Aircraft Possessed[3]	MC Rate	TNMCM Rate	TNMCS Rate	CANN Rate
Home Station	15.5	.69	.25	.12	.35
Saudi (SW)	3.5	.75	.17	.12	.10
Turkey (NW)	2.7	.76	.13	.15	.11
ALLIED FORCE	4.0	.87	.13	.01	.0
ACC Total	22.6	.72	.22	.12	.25
Kadena	2.0	.66	.22	.19	.15
Elmendorf	2.0	.80	.13	.12	.03
PACAF Total	4.0	.73	.18	.16	.08
Entire Fleet Totals	26.6	.69	.23	.14	.22

Source: OC-ALC/LAKMA Indicator Report

Enroute shipping times to the various deployed locations significantly impacts MICAP duration and related mission capable rates. In instances where the deployed location host only two or three aircraft, the difference of one or two days in shipping time, multiplied by twenty to thirty events per month, can make the difference between achieving the desired TNMCS rate, or busting it. Considering a simple example of one aircraft in Saudi that requires four MICAP shipments per month. As shown in Figure X below, substantial reductions in delivery times resulting from SCP and depot rapid-fulfillment initiatives favorably impact TNMCS rates.

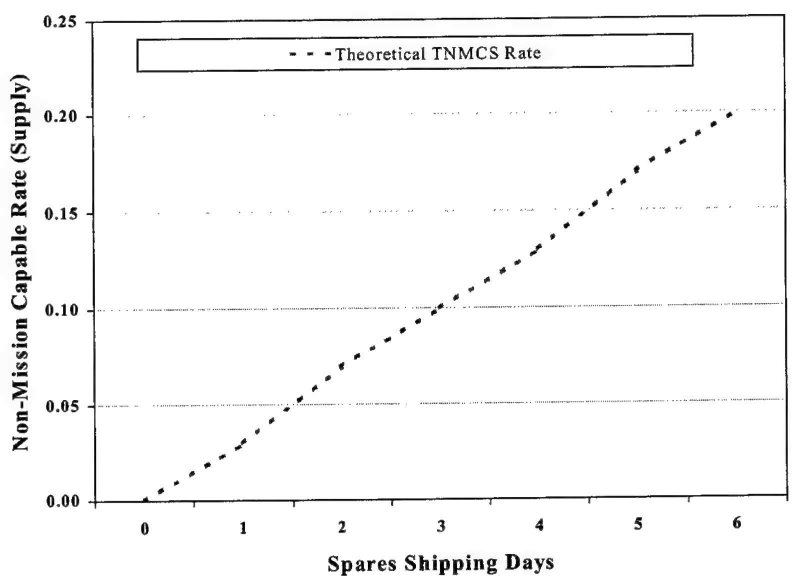

Figure 5. Impact of Shipping Times on Saudi NMCS Rates

Increases in Kit Funding

A recent decision to increase E-3 RSP funding levels should raise kit fill rates substantially, although exact fill-rate numbers are not yet available. In a message to all MAJCOMs, AFMC/CC notes that changing operational requirements justify increased spares expenditures

and larger kit sizes.[4] For the E-3B system, the increase is approximately $13M more in spares funding. Estimates from the OC-ALC kit manager are that fill rates may reach an average of between 85 and 90 percent once all the newly authorized spares are fielded.

Notes

[1] Maj Roach interview.
[2] Ibid.
[3] "Aircraft Possessed" determined by totaling hours possessed on all aircraft during the month and dividing by number of hours in the month.
[4] Message P311813Z JAN 00, AFMC/CC to MAJCOM/CCs, 31 January 2000.

Part 5

Conclusions

The battle is fought and decided by the quartermasters before the shooting begins

— Field Marshal Erwin Rommel

Because of the E-3's complexity as a weapon system and the all-too-well-known problems of supporting aging aircraft, it's likely spares support will continue to be a challenge in the coming decade. On the positive side, without question a number of current spares-enhancement efforts (e.g., increased Boeing support, surplus parts buys, KC-135 parts cross matches) are paying great dividends in decreased TNMCS rates. However, the sheer number of E-3 parts in the system make effective tracking and analysis of every potential problem part difficult at best. Consequently, a "chasing your tail" drill is likely to continue as ever-new parts make the "top ten" worst offender list, perhaps facilitated by ongoing modifications which drive changes in MTBF rates. Shifting from a reactive spares-response mode is clearly a huge challenge, but a necessary one if overall mission capable rates are to be favorably affected.

More than any other supply-related factor examined during the author's limited E-3 spares review, it appears the SCP's close monitoring of world-wide E-3 MICAP situations (both real and threatened by temporarily reduced RSP kit levels), coupled with a highly-responsive OC-ALC E-3 element, offer the greatest potential of keeping TNMCS rates low. As the old saying goes, "An ounce of prevention is worth a pound of cure." By closely tracking recent supply-out conditions at deployed locations, kit composition can be boosted immediately, and pre-emptive

backfills initiated. As pointed out by SCP personnel, a lateral part transfer from one deployed location to another, with a backfill to the donor, is almost always faster than a CONUS shipment to the MICAP holder. Moreover, the use of commercial shipping companies, vice organic airlift through AMC, save precious days in getting needed parts to deployed locations around the globe.

Recognizing the limited small-fleet applicability of an aircraft sustainability model like PC-REALM remains a critical element in overall E-3 spares health as it relates to kit composition. An uninformed headquarters view might suggest that model recommendations for kit levels be considered gospel, but there is simply no substitute for kit manager good judgement and sanity checks during the annual kit review process. For example, the previous year's supply demand data on a particular reparable item might contain unusually large values, perhaps reflecting a temporary condition not likely to be repeated during the coming year. Such might be the case during ongoing aircraft modifications when newly delivered parts exhibit higher-than-expected failure rates early on but recent engineering changes have now extended the MTBF and thus provide a better predictor if only the last few months are considered.

In reviewing both the NATO and US-owned E-3 logistical support provided to deployed aircraft during Operation ALLIED FORCE, it is likely the high in-service rates could not have been sustained without the generous, timely loan of NATO spares. Consequently, it would be imprudent to consider the operation an unqualified success from the logistical support standpoint as it's unclear RSPs and subsequent spares shipments would have been adequate. As noted in the SECDEF/CJCS joint statement outlining DoD's after-action assessment of operations in Kosovo during ALLIED FORCE, limited in-theater airfields "slowed aircraft turnaround times, limited throughput, and slowed the onward movement of forces and humanitarian supplies."[1] This suggests that ultimately, the best spares solution of all is increased E-3 system reliability, as

it would reduce the need for the current large number of spares and associated airlift support requirements.

Notes

[1] Senate. *Joint Statement on the Kosovo After Action Review: Hearings before the Senate Armed Forces Committee,* 104th Cong., 2nd sess., 1999

Glossary

ACC	Air Combat Commamd
ALC	Air Logistics Center
ASM	Aircraft Sustainability Model
AWACS	Airborne Warning and Control System
CANN	Short for Cannibalization, a maintenance activity where parts are removed from one plane and placed on another
CONOPS	Concept of Operations
DLA	Defense Logistics Agency
DOD	Department of Defense
FMC	Fully Mission Capable
IRSP	In-place Readiness Spares Package
MC	Mission Capable
MC Rate	Ratio of MC Hours/Possessed Hours
MICAP	Condition which renders aircraft non-mission capable
MSRP	Mobility Readiness Spares Package
MTBF	Mean Time Between Failures
MTBM	Mean Time Between Maintenance
PDM	Programmed Depot Maintenance
PMC	Partially Mission Capable
REALM	Requirements Execution Availability Logistics Module
R&M	Reliability and Maintainability
RSP	Readiness Spares Package
SCP	Sentry Control Point
SPD	System Program Director
TNMCM	Total Non-Mission Capable Maintenance (E-3 goal <= 10%)
TNMCS	Total Non-Mission Capable Supply (E-3 goal <= 6%)
WSSC	Weapon System Support Center

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